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FIRST-YEAR SURVIVAL AND DENSITIES OF 1982 PLANTATIONS

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FIRST YEAR SURVIVAL AND DENSITIES OF 1982 PLANTATIONS

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ABSTRACT

One thousand three hundred and thirty-two plots were established in NBDNR 1982 plantations. Overall survival one year after planting was 76 percent for bare root stock and 85 percent for paper pot stock and 89 percent for styroblock stock.

The average planting density was 1 910 trees per hectare and the average density one year after planting was 1 570 trees per hectare. Based on NBDNR resource regions between 16 and 42 percent of the plantation area had planting densities outside the range of 1 650 to 3 000 trees per hectare.

The average first year height growth of container stock was greater than that of bare root stock. There was little difference in height growth between paper pot and styroblock stock.

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INTRODUCTION

The province of New Brunswick has had an active tree planting program on Crown Land since the early sixties. In 1974, with the aid of federal funding through a Federal-Provincial Agreement the program began to expand rapidly, reaching 28.6 million seedlings in 1981. With the expanding planting program came the need for a monitoring system which would serve as a feedback for all other aspects of the reforestation program and would assist in predicting plantation development.

Originally each forest region was responsible for monitoring its own plantations but in 1977 the Forest Management Branch assumed responsibility for monitoring all plantations on Crown Land. Monitoring during the establishment stage (0 - 3 years) is concerned primarily with survival rates, initial height growth and planting densities. Plots are established shortly after planting and are remeasured after the first and third years. Starting at age five, growth and development are monitored at five year intervals.

The results of the assessment of 1977 to 1981 plantations have been reported previously. This report contains information on planting densities, height and first year survival of 1982 plantations.

Up until 1982 the provincial government had been doing most of the planting with only a small amount under contracted but

under the Forest Management Agreement signed in 1982 ten licensee's assumed responsibility for forest management on crown land. 1982 was the transitional year in which licensees did some of the planting and the provincial government did some of the planting. Summaries in this report are by region even though the region did not do all the planting.

METHODS

Planting areas were mapped and stratified into "assessment blocks" by planting supervisors. Assessment crews established 5 metre radius plots in the blocks so as to give a representative sampling of the area. One thousand three hundred and thirty-two plots were established in 12 610 hectares of 1982 plantations.

Within the plots each planted tree was staked, numbered and measure for height. The plots were remeasured in 1982. Density and height at planting, and survival, density and height after one year were calculated.

RESULTS AND DISCUSSION

Appendix I lists the survival, density and height information for all plantations. Prior to 1984 results of first year assessment and maps of plot locations was sent to Regional Resource Managers for their use (fill planting decisions, etc.).

SURVIVAL

Overall survival one year after planting was 85 percent for paper pot stock and 76 percent for bare root stock and 89 percent for styroblock stock (Table 1). Twenty-two percent of the area planted with bare root stock had survival rates below 60 percent as compared with 11 percent for paper pot stock and 6 percent for styroblock stock (Table 2). Survival rates were not consistent as in previous years which probably results from the larger number of organizations involved in the planting and the lack of experience of some of them. Steps taken to improve the quality of bare root stock seem to have had an effect. First year survival of 1981 paper pot stock was 90 percent and of bare root stock was 65 percent, a difference of 25 points as compared to the 9 point difference for 1982 plantations. Bare root jack pine survived as well as paper pot jack pine (Table 1). It is the bare root spruce that did not perform as well as its paper pot counterpart. There is a problem with survival of red pine bare root and larch paper pots so efforts should be directed to improving their quality. There was only a small amount of styroblock stock planted but survival appears to be similar to paper pot stock.

DENSITY

In 1982 plantations the average planting density was 1 910 trees per hectare and the average density one year after planting was 1 570 trees per hectare. The NBDNR guide to licensees is to plant 2 000 trees per hectare with a minimum acceptable standard of 1 650 planted trees per hectare in the year of establishment.

However averages do not give the entire picture. Figures 1 - 5 show the distribution of plots in each density class at the time of planting. Based on NBDNR resource regions between 3 and 9 percent of the plots did not have any trees. This is an improvement over 1981 plantations when between 4 and 14 percent of the plots did not have trees however there is still a need to make sure planters do not miss plantable areas and that the plantation map accurately reflects the area that is planted.

The "Forest Management Manual for Crown Lands" specifies that plantations are to have not more than 3 000 trees per hectare at year five (including acceptable natural regeneration). If we consider 3 000 trees per hectare as the maximum number that should be planted then we have a range of "acceptable" planting densities from 1 650 to 3 000 trees per hectare. Table 3 gives the percent of the plots that were below, within and above this "acceptable" range. Based on NBDNR resource regions between 16 and 42 percent of the plots were not in the "acceptable" range. Adequate site preparation, good planting procedures and intensive supervision are necessary to keep the planting density in the "acceptable" range.

HEIGHTS

Table 4 shows the average height of 1982 seedlings at the time of planting and after one year. In general, bare root stock was taller at the time of planting but grew less than container stock (3 cm versus 8 cm). There was little difference in height growth between paper pot and styroblock stock (6.5 versus 7.5 cm). Larch paper pot stock grew rapidly during the first year more than doubling in height from 9 cm to 22 cm. Browse was noted on all species and makes it difficult to draw definite conclusions about growth.

CONCLUSION

Survival of container stock is better than survival of bare root stock but the difference is less than in previous years. Larch paper pots, black spruce bare root and red pine bare root had the poorest survival.

The average planting density is close to the desired planting density and the portion of the area reported as being planted that was not planted is less than in previous years. However careful attention to planting density is required because a significant portion of the planted area had densities outside the "acceptable" range.

Container stock grows more during the first year then bare root stock. There is little difference in height growth between paper pot and styroblock stock during the first year. Larch grew more during the first year than other species.

Table 1. Survival in percent one year after planting by species and stock type for 1982 plantations

Region	Black Spruce			White Spruce		Jack Pine			Red Pine	Larch
	BR[1]	PP[2]	SB[3]	BR	PP	BR	PP	SB	BR	PP
1	65	88	-	-	-	-	80	-	-	70
2	84	83	-	72	-	100	76	-	66	-
3	76	83	-	59	-	97	89	89	-	-
4	78	83	89	80	89	82	91	-	80	-
5	88	91	-	89	80	-	-	-	-	88
Prov	75	86	89	81	84	85	85	89	77	71

[1]Bare root stock
[2]Paper pot stock
[3]Styroblock stock

Table 2. 1982 Plantation areas[A] by stock type, species, region and survival class

Stock Type	Species	Region	Survival Classes					Total
			100 - 91%	90 - 81%	80 - 61%	60 - 41%	<40%	
Paper Pot	Larch	1	51[B] (16)[C]	55 (18)	90 (29)	112 (36)	0	308
		5	5 (39)	8 (61)	0	0	0	13
		Total	56 (17)	63 (20)	90 (28)	112 (35)	0	321
	Black Spruce	1	898 (60)	379 (26)	116 (8)	74 (5)	19 (1)	1 486
		2	566 (46)	246 (20)	302 (25)	96 (8)	13 (1)	1 223
		3	533 (44)	292 (24)	223 (18)	106 (9)	54 (4)	1 207
		4	325 (42)	148 (19)	193 (25)	58 (7)	52 (7)	776
		5	708 (68)	200 (19)	123 (12)	16 (2)	0	1 047
		Total	3 030 (53)	1 266 (22)	955 (17)	350 (6)	137 (2)	5 738
	White Spruce	4	13 (57)	10 (43)	0	0	0	23
		5	13 (38)	0	12 (34)	10 (28)	0	35
		Total	26 (45)	10 (17)	12 (21)	10 (17)	0	58
	Jack Pine	1	307 (33)	282 (30)	219 (23)	115 (12)	17 (2)	939
		2	109 (20)	140 (26)	78 (14)	187 (34)	27 (5)	542
		3	521 (57)	150 (17)	154 (17)	51 (6)	32 (3)	908
		4	623 (78)	99 (12)	40 (5)	29 (4)	5 (1)	797
		Total	1 560 (49)	672 (21)	491 (15)	382 (12)	81 (3)	3 186
Paper Pot	Summary		4 672 (50)	2 011 (22)	1 548 (17)	854 (9)	218 (2)	9 303
Styroblock	Black Spruce	4	110 (52)	52 (25)	41 (19)	9 (4)	0	213
	Jack Pine	3	110 (60)	35 (19)	24 (13)	13 (7)	0	182
Styroblock	Summary		220 (56)	87 (22)	66 (17)	23 (6)	0	395

Table 2. (cont'd)

Stock Type	Species	Region	Survival Classes					
			100 - 91%	90 - 81%	80 - 61%	60 - 41%	<40%	Total
Bare Root	Black Spruce	1	69 (14)	68 (14)	148 (31)	132 (28)	62 (13)	479
		2	122 (41)	80 (27)	55 (18)	40 (13)	0	298
		3	190 (38)	108 (21)	126 (25)	62 (12)	19 (4)	505
		4	77 (34)	64 (29)	38 (17)	14 (6)	30 (13)	222
		5	59 (66)	0	28 (31)	3 (3)	0	90
		Total	517 (32)	320 (20)	395 (25)	250 (16)	110 (7)	1 593
	White Spruce	2	10 (33)	10 (34)	0	10 (33)	0	30
		3	0	5 (50)	0	5 (50)	0	10
		4	19 (24)	4 (5)	31 (39)	0	25 (32)	79
		5	56 (67)	9 (11)	13 (15)	6 (7)	0	83
		Total	85 (42)	28 (14)	44 (22)	21 (10)	25 (12)	203
	Red Pine	2	0	0	58 (69)	26 (31)	0	83
		4	74 (39)	33 (17)	47 (24)	25 (13)	12 (6)	191
		Total	74 (27)	33 (12)	104 (38)	51 (19)	12 (4)	274
	Jack Pine	2	8 (100)	0	0	0	0	8
		3	18 (100)	0	0	0	0	18
		4	65 (53)	15 (13)	27 (22)	15 (12)	0	122
		Total	90 (61)	15 (10)	27 (18)	15 (10)	0	148
Bare Root	Summary		766 (35)	397 (18)	571 (26)	336 (15)	147 (7)	2 217

A - includes only plantations in which assessment blocks were established
B - hectares
C - percent of region total

Table 3. Percent of the 1982 assessment plots in each planting density class by region.

Region	0-1650	1650-3000	greater than 3000
1	27	72	1
2	15	84	1
3	27	58	15
4	30	63	7
5	34	64	2
Province	27	67	6

Table 4. Height at time of planting and after one year, by species and stock type for 1982 plantations.[A]

Region		Black Spruce			White Spruce		Jack Pine			Red Pine	Larch
		BR[1]	PP[2]	SB[3]	BR	PP	BR	PP	SB	BR	PP
1	ORIG*	28	14	-	-	-	-	7	-	-	9
	1st Yr+	29	21	-	-	-	-	13	-	-	21
2	ORIG	28	13	-	17	-	16	10	-	14	-
	1st Yr	31	17	-	22	-	38	19	-	17	-
3	ORIG	26	9	-	15	-	10	6	15	-	-
	1st Yr	31	15	-	16	-	20	14	25	-	-
4	ORIG	27	12	17	21	11	18	8	-	19	-
	1st Yr	28	19	22	25	27	19	19	-	21	-
5	ORIG	27	11	-	28	10	-	-	-	-	18
	1st Yr	32	15	-	30	14	-	-	-	-	30
Prov.	ORIG	27	12	17	23	10	17	7	15	17	9
	1st Yr	30	17	22	26	19	21	15	25	20	22

1 Bare root stock type
2 Paper pot stock type
3 Styroblock stock type
* Height in cm at time of planting measured after seedlings were planted
\+ Height in cm one year after planting
A Browse damage was noted on a number of seedlings

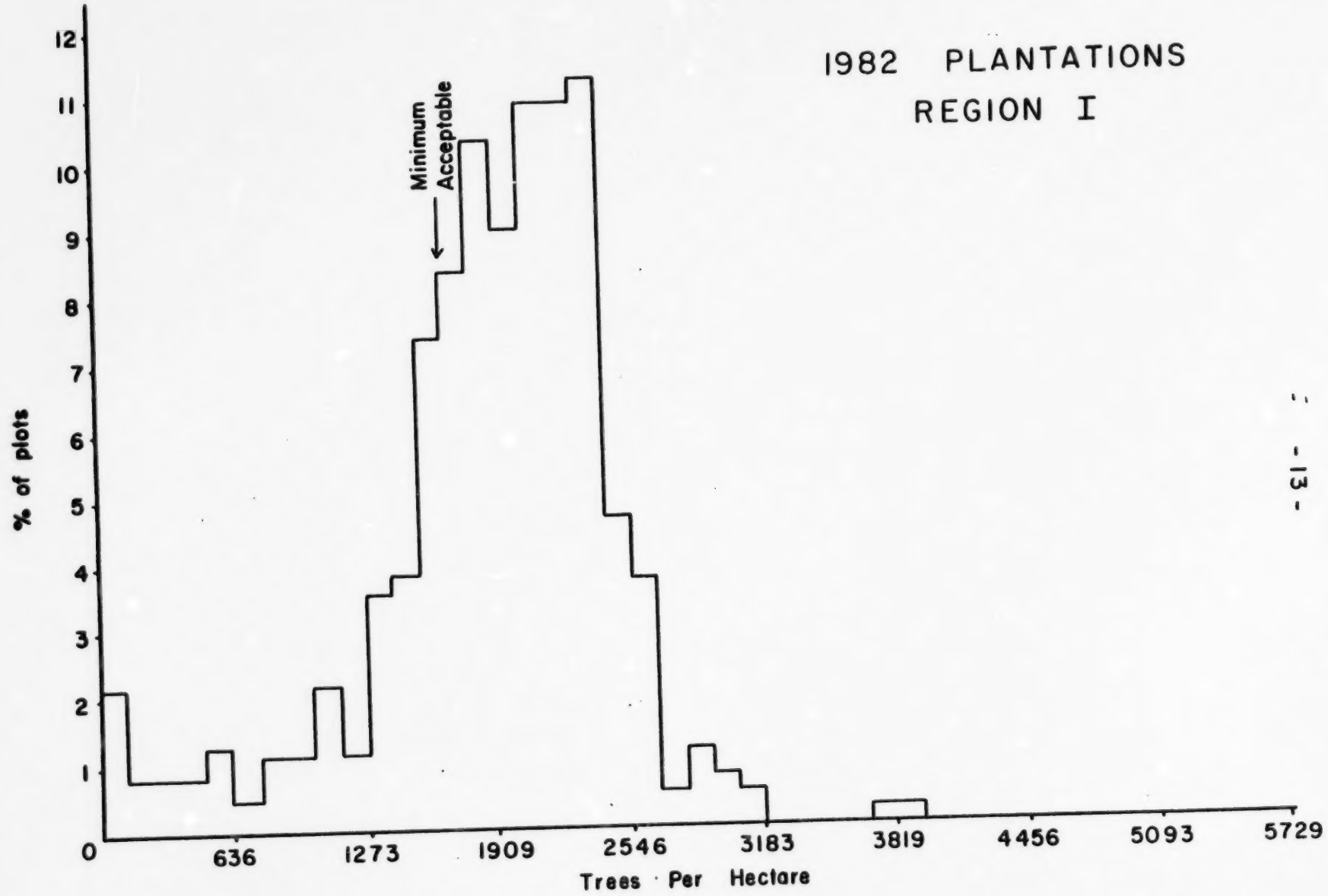


FIGURE I - Percent of plots versus number of planted trees per hectare at time of establishment - Region I

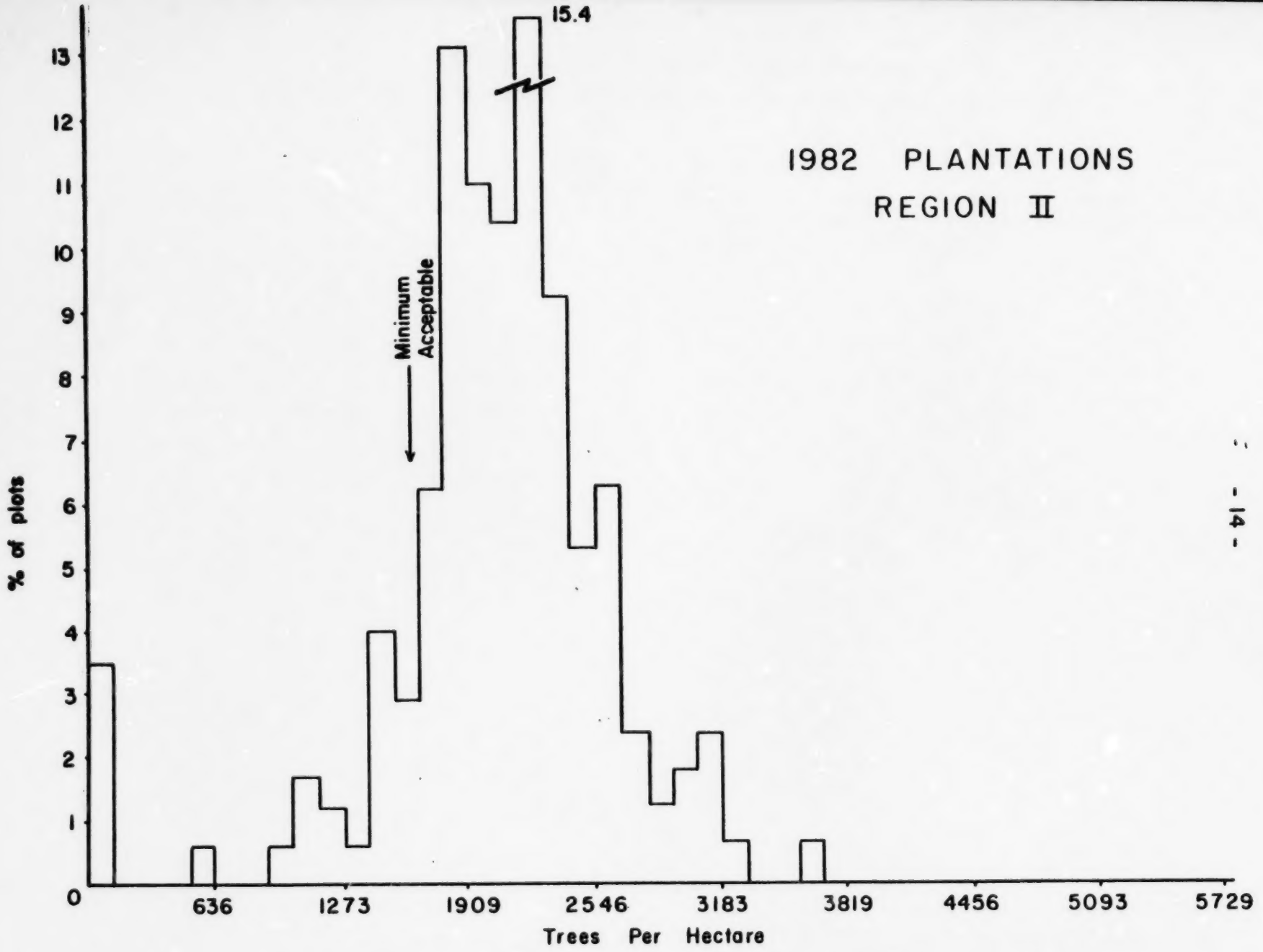


FIGURE II - Percent of plots versus number of planted trees per hectare at time of establishment - Region II

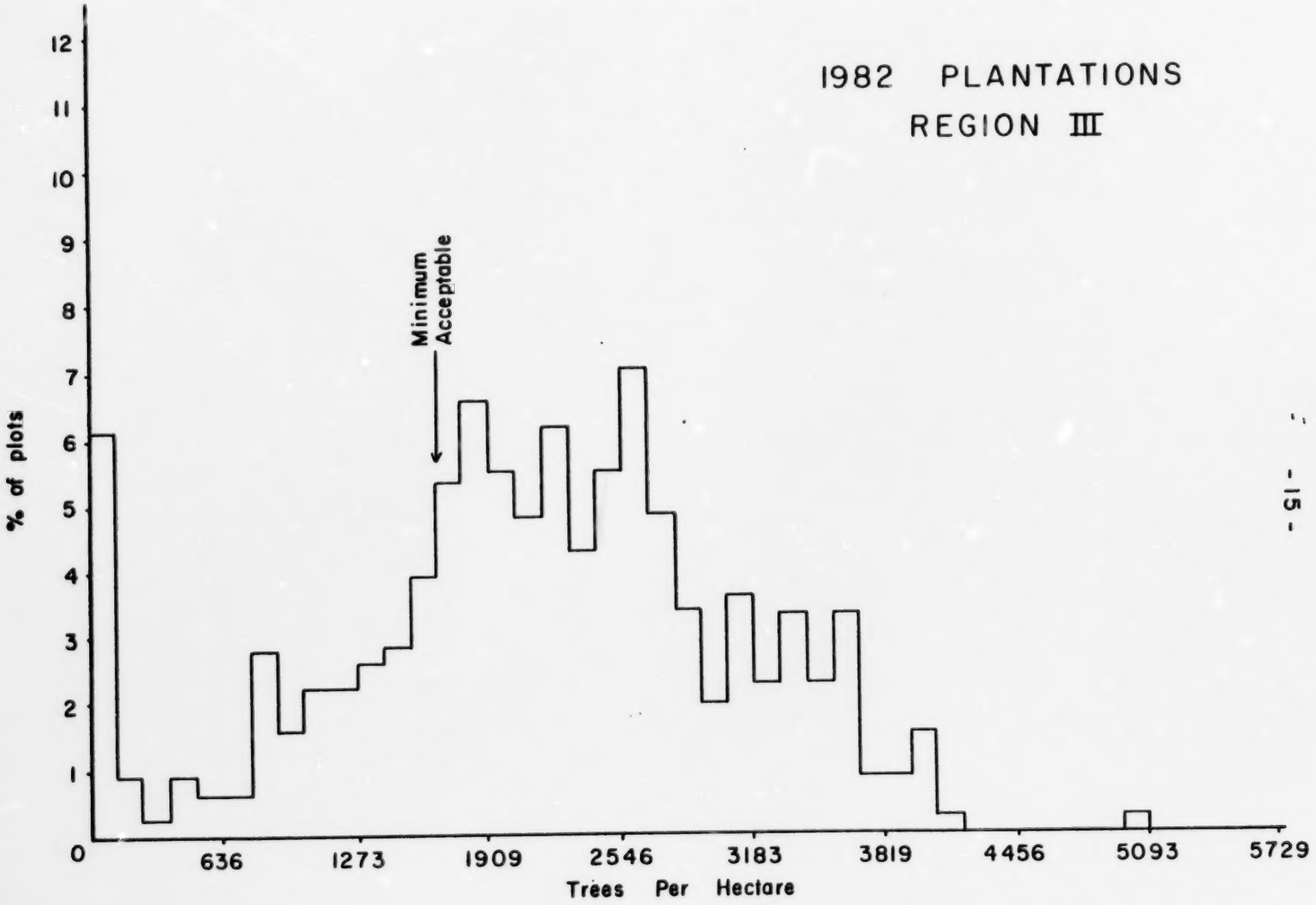


FIGURE III - Percent of plots versus number of planted trees per hectare at time of establishment - Region III

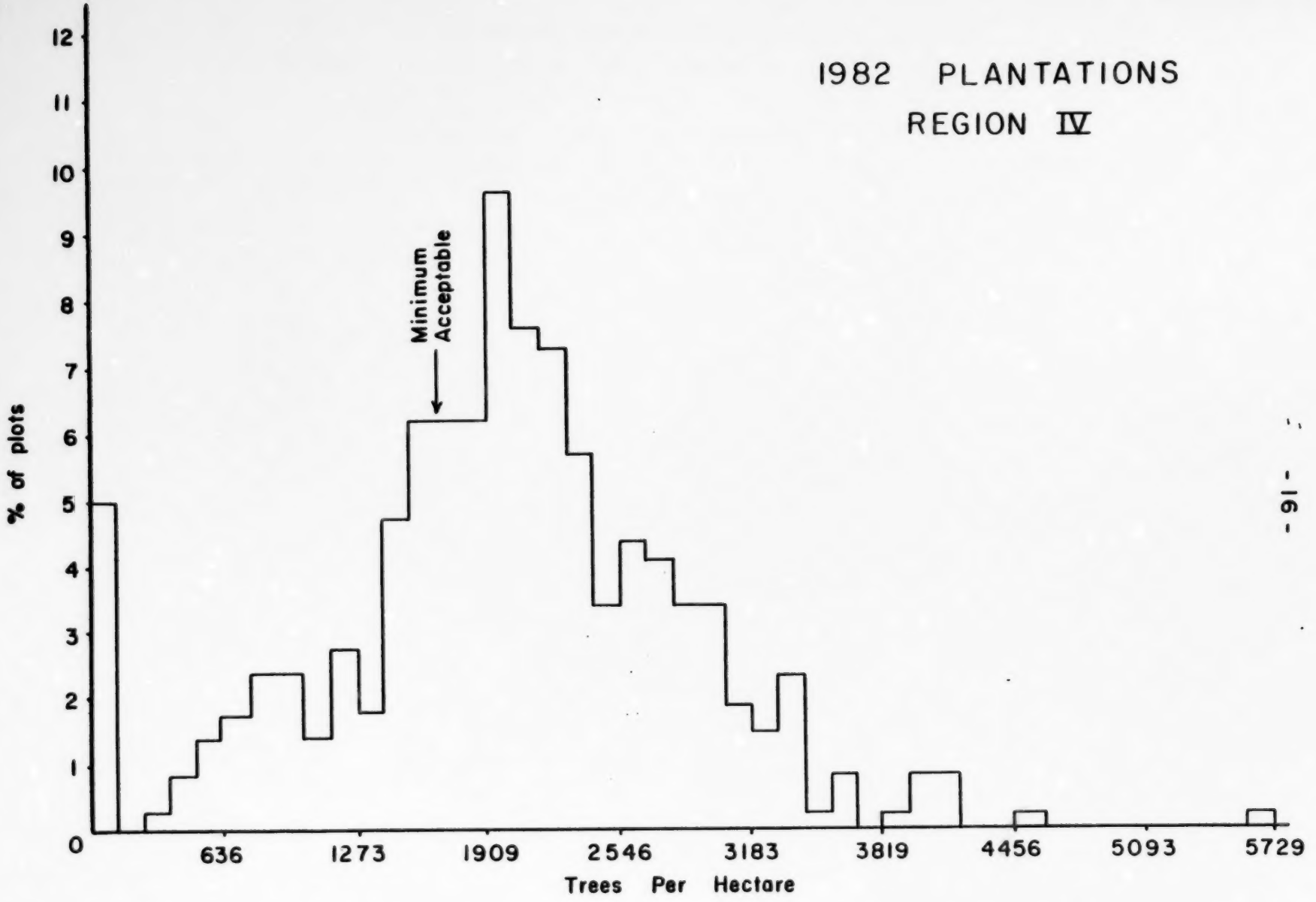


FIGURE IV - Percent of plots versus number of planted trees per hectare at time of establishment - Region IV

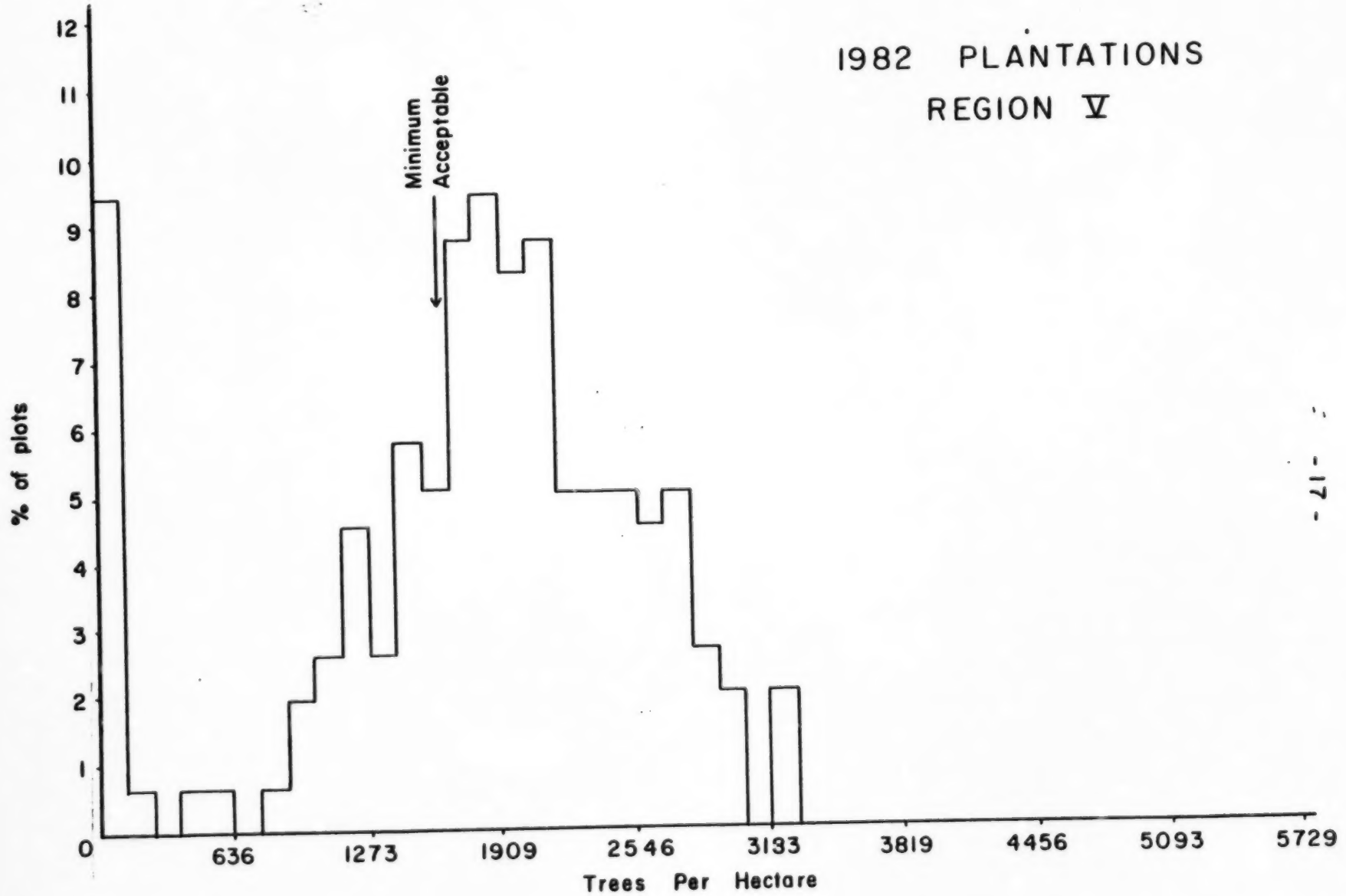


FIGURE V - Percent of plots versus number of planted trees per hectare at time of establishment - Region V

Appendix 1

First Year Survival, Densities and Heights
of 1982 Plantations

Region	Plantation	Site Preparation	Area (ha)	Species	Stock Type	Original Year Density (trees/ha)	Original Year Height (cm)	First Year Survival (%)	First Year Density (trees/ha)	First Year Height (cm)
1	P-32-82	Burn & Disc Trencher	33	bS	br	2 120	29	68	1 440	31
				jP	pp	2 420	13	95	2 290	18
	P-33-82	C&H Plow	68	bS	br	2 040	29	71	1 440	29
	P-34-82	C&H Plow	7	bS	br	2 160	31	50	1 080	34
	P-36-82	Finnish Plow	26	bS	br	1 930	20	83	1 630	23
	P-37-82	C&H Plow	90	bS	br	1 540	25	66	1 020	25
	P-38-82	Disc Trencher	57	bS	br	1 700	27	65	1 100	25
	P-39-82	Burn & C&H Plow	64	bS	br	1 590	31	45	720	31
	P-40-82	C&H Plow	45	bS	br	1 220	35	81	980	35
	P-54-82	C&H Plow	132	bS	br	1 980	28	58	1 150	33
	FP-3-82	Finnish Plow	93	jP	pp	-	-	-	1 230	19
				bS Orig	br	-	-	-	1 620	58
	FP-4-82	Burn & Disc Trencher	21	bS	pp	-	-	-	2 290	19
				bS Orig	br	-	-	-	1 146	46
	TP-72-82	Burn & C&H Plow	5	bS	pp	2 040	15	81	1 660	15
	TP-73-82	Burn & Disc Trencher	34	bS	pp	1 530	18	88	1 340	18
				jP	pp	1 780	15	98	1 740	17
	TP-74-82	Disc Trencher	32	jP	pp	1 810	14	81	1 460	16
	TP-75-82	C&H Plow	40	bS	pp	1 940	15	66	1 270	14
				jP	pp	960	13	100	960	12
	TP-76-82	C&H Plow	44	jP	pp	2 060	14	75	1 550	7
	TP-77-82	C&H Plow	51	bS	pp	1 610	13	89	1 440	9
				jP	pp	1 720	12	81	1 400	9
	TP-78-82	Barrels & Chains	158	bS	pp	2 190	13	96	2 090	21

Region	Plantation	Site Preparation	Area (ha)	Species	Stock Type	Original Year		First Year		
						Density (trees/ha)	Height (cm)	Survival (%)	Density (trees/ha)	Height (cm)
1	TP-79-82	Barrels & Chains	95	bS	pp	1 940	14	95	1 830	22
	TP-80-82	Barrels & Chains	98	bS	pp	2 000	16	94	1 870	22
	TP-81-82	Barrels & Chains	124	bS	pp	1 800	15	95	1 710	27
	TP-82-82	Barrels & Chains	82	bS	pp	2 430	14	93	2 270	18
				jP	pp	1 550	6	73	1 133	11
	TP-83-82	C&H Plow	153	bS	pp	1 970	15	69	1 370	21
	TP-84-82	C&H Plow	48	bS	pp	1 930	13	74	1 420	16
	TP-85-82	Burn & Disc Trencher	15	bS	pp	1 620	13	82	1 340	18
	TP-86-82	C&H Plow	79	bS	pp	1 940	15	83	1 620	19
	TP-87-82	Barrels & Chains	48	jP	pp	1 960	6	81	1 580	10
	TP-88-82	Disc Trencher	90	jP	pp	2 130	5	90	1 920	11
	TP-89-82	Burn & Disc Trencher	27	jP	pp	1 780	5	96	1 720	11
	TP-90-82	C&H Plow	94	L	pp	1 720	9	72	1 240	20
	TP-91-82	C&H Plow	106	L	pp	1 290	9	66	850	25
	TP-92-82	C&H Plow	42	L	pp	2 290	9	69	1 590	21
	TP-93-82	Barrels & Chains	80	jP	pp	2 110	6	85	1 800	9
	TP-118-82	C&H Plow	95	jP	pp	1 260	6	72	910	11
	TP-120-82	Barrels & Chains	110	jP	pp	2 060	6	70	1 440	12
				L	pp	130	11	100	130	23
	TP-123-82	Barrels & Chains	53	jP	pp	1 470	5	68	1 000	14
	TP-124-82	Barrels & Chains	50	L	pp	960	7	70	670	15

Region	Plantation	Site Preparation	Area (ha)	Species	Stock Type	Original Year		First Year		
						Density (trees/ha)	Height (cm)	Survival (%)	Density (trees/ha)	Height (cm)
1	TP-125-82	C&H Plow	40	bS	pp	1 960	15	94	1 840	24
	TP-126-82	C&H Plow	32	bS	pp	1 850	16	88	1 620	24
	TP-127-82	C&H Plow	13	bS	pp	1 910	10	87	1 660	20
	TP-128-82	C&H Plow	50	bS	pp	2 180	14	98	2 150	21
	TP-129-82	C&H Plow	80	bS	pp	1 820	14	91	1 660	23
	TP-130-82	Barrels & Chains	73	jP	pp	2 450	6	75	1 840	12
	TP-131-82	Barrels & Chains	69	jP	pp	1 560	5	84	1 300	12
	TP-132-82	C&H Plow	73	bS	pp	1 770	16	96	1 690	23
	TP-133-82	C&H Plow	130	bS	pp	1 860	12	96	1 780	22
	TP-134-82	C&H Plow	49	jP	pp	1 950	14	94	1 840	28
	TP-135-82	Barrels & Chains	162	bS	pp	1 420	15	90	1 270	23
2	P-49-82	Plow	117	bS	br	1 910	21	82	1 570	23
	P-50-82	Plow	97	bS	br	1 790	36	94	1 680	40
				rP	br	2 290	12	78	1 780	14
	P-51-82	Plow	77	rP	br	1 850	14	65	1 200	18
	P-52-82	Crusher	190	bS	br	1 910	24	73	1 400	27
				wS	br	2 290	20	69	1 590	25
	TP-105-82	Plow	336	bS	pp	1 940	15	95	1 830	17
	TP-106-82	Plow	115	bS	pp	1 770	8	84	1 490	14
	TP-108-82	Plow	410	bS	pp	1 870	10	81	1 520	17
	TP-109-82	Plow	300	jP	pp	2 630	9	59	1 560	18
	TP-110-82	Burn	31	jP	pp	2 670	11	81	2 160	18

Region	Plantation	Site Preparation	Area (ha)	Species	Stock Type	Density (trees/ha)	Height (cm)	Survival (%)	Density (trees/ha)	Height (cm)
2	TP-111-82	Plow	139	jP	pp	1 730	16	79	1 370	29
	TP-113-82	Burn	162	bS	pp	2 000	14	73	1 460	17
	TP-115-82	Burn	83	jP	br	2 550	16	100	2 550	38
				jP	pp	2 150	8	92	1 980	15
	TP-116-82	Burn	25	bS	pp	2 130	11	94	2 000	14
	TP-117-82	Burn	105	bS	pp	1 940	15	94	1 830	16
3	P-5-82	C&H Plow	47	bS	br	2 650	25	73	1 930	28
	P-6-82	C&H Plow	140	bS	br	2 450	21	71	1 730	26
				wS	br	3 690	15	59	2 160	16
	P-7-82	C&H Plow	5	bS	br	1 970	17	77	1 530	23
	P-41-82	C&H Plow	31	bS	br	2 310	39	91	2 100	42
	P-42-82	C&H Plow	121	bS	br	1 340	29	91	1 220	37
	P-43-82	Barrels & Chains	30	bS	br	2 360	29	80	1 890	34
	P-44-82	Crusher	12	bS	br	1 480	32	64	940	33
				jP	sb	2 290	10	89	2 040	25
	P-45-82	Crusher	16	bS	br	1 500	35	58	870	38
	P-46-82	C&H Plow	69	bS	br	1 300	40	100	1 300	40
	TP-4-82	C&H Plow	116	bS	pp	2 140	9	76	1 620	15
	TP-5-82	C&H Plow	116	bS	pp	1 720	10	88	1 520	17
	TP-6-82	C&H Plow	90	bS	pp	1 360	8	70	1 020	15
	TP-7-82	C&H Plow	14	bS	pp	2 670	9	90	2 390	15
	TP-8-82	C&H Plow	145	bS	pp	1 680	7	78	1 300	16

Region	Plantation	Site Preparation	Area (ha)	Species	Stock Type	Original Year Density (trees/ha)	Original Year Height (cm)	First Year Survival (%)	First Year Density (trees/ha)	First Year Height (cm)
3	TP-9-82	C&H Plow	179	bS	pp	2 500	8	81	2 030	12
				jP	pp	2 320	4	92	2 128	12
	TP-10-82	C&H Plow	77	bS	pp	2 250	9	96	2 160	10
	TP-11-82	C&H Plow	264	bS	pp	2 310	9	92	2 120	15
				jP	pp	2 280	5	89	2 030	14
	TP-14-82	C&H Plow	152	bS	pp	1 950	9	92	1 790	14
				jP	pp	2 210	3	94	2 070	13
	TP-15-82	C&H Plow	206	bS	pp	1 810	9	70	1 260	15
	TP-16-82	C&H Plow	46	jP	pp	1 430	4	100	1 430	12
	TP-17-82	C&H Plow	90	bS	pp	1 890	6	87	1 640	12
				jP	pp	1 950	6	95	1 850	15
	TP-18-82	C&H Plow	25	jP	pp	3 150	5	86	2 710	12
	TP-20-82	C&H Plow	193	jP	pp	2 970	7	91	2 690	15
	TP-21-82	C&H Plow	255	jP	pp	1 840	6	78	1 420	14
	TP-95-82	C&H Plow	28	jP	br	1 530	14	100	1 530	26
				jP	sb	1 530	14	100	1 530	22
	TP-96-82	C&H Plow	53	bS	pp	1 660	10	88	1 460	16
	TP-97-82	Crusher	26	jP	sb	1 890	13	90	1 700	26
	TP-98-82	C&H Plow	115	bS	br	2 160	36	100	2 160	38
				bS	pp	1 780	10	97	1 730	15
	TP-99-82	C&H Plow	73	jP	sb	1 510	18	83	1 260	25
	NRP	C&H Plow		bS	pp	1 020	8	88	890	11
	NRP	C&H Plow		jP	sb	640	21	100	640	35

Region	Plantation	Site Preparation	Area (ha)	Species	Stock Type	Original Year Density (trees/ha)	Original Year Height (cm)	First Year Survival (%)	First Year Density (trees/ha)	First Year Height (cm)
4	P-1-82	Barrels & Chains	29	bS	br	1 730	31	66	1 146	31
	P-2-82	Barrels & Chains	36	rP	br	2 290	20	94	2 160	21
	P-3-82	Barrels & Chains	34	bS	br	2 590	21	85	2 210	22
	P-4-82	Barrels & Chains	24	wS	br	2 190	21	84	1 850	22
	P-23-82	Barrels & Chains	14	wS	br	1 910	14	80	1 530	16
				jP	br	1 780	15	50	890	18
	P-24-82	Barrels & Chains	21	wS	br	640	14	40	260	18
	P-25-82	Barrels & Chains	59	jP	br	980	19	96	930	20
	P-26-82	Barrels & Chains	43	bS	br	1 590	14	88	1 400	14
				rP	br	1 780	17	81	1 450	18
	P-28-82	Barrels & Chains	14	wS	br	2 550	28	83	2 100	37
	P-29-82	Barrels & Chains	32	rP	br	2 420	17	90	2 180	26
	P-30-82	Barrels & Chains	12	bS	br	2 290	37	83	1 910	36
	P-31-82	Barrels & Chains	97	rP	br	2 220	22	70	1 550	20
	P-47-82	Barrels & Chains	77	bS	br	2 550	38	60	1 530	40
				jP	br	2 610	17	79	2 060	17
				rP	br	2 630	14	58	1 530	13
	P-48-82	Barrels & Chains	120	bS	br	1 980	30	75	1 480	34
	FP-1-82	C&H Plow	46	jP	pp	3 370	4	76	2 560	11
				jP Orig	pp	3 230	21	75	2 410	37
	FP-2-82	Barrels & Chains	25	bS Orig	br	1 530	24	94	1 430	31
	TP-1-82	Barrels & Chains	217	bS	pp	1 710	15	88	1 500	22
	TP-2-82	Barrels & Chains	14	bS	br	2 480	20	87	2 160	20
	TP-3-82	Barrels & Chains	68	bS	pp	2 100	11	81	1 700	20

Region	Plantation	Site Preparation	Area (ha)	Species	Stock Type	Original Year Density (trees/ha)	Original Year Height (cm)	First Year Survival (%)	First Year Density (trees/ha)	First Year Height (cm)
4	TP-12-82	Burn & C&H Plow	14	jP	pp	1 270	6	87	1 100	15
	TP-13-82	Barrels & Chains	38	bS	pp	2 290	19	89	2 040	29
				jP	pp	1 980	9	70	1 382	19
	TP-50-82	Barrels & Chains	8	bS	br	760	36	100	760	37
				jP	pp	1 910	6	93	1 780	7
	TP-51-82	Barrels & Chains	80	jP	pp	1 320	8	90	1 190	17
	TP-52-82	Barrels & Chains	178	bS	sb	1 570	17	88	1 390	21
	TP-53-82	Barrels & Chains	76	jP	pp	1 440	7	84	1 220	14
	TP-54-82	Barrels & Chains	102	bS	pp	2 160	10	69	1 490	19
	TP-55-82	Barrels & Chains	43	bS	pp	1 770	8	90	1 620	16
				bS	sb	1 970	16	95	1 860	25
	TP-56-82	Barrels & Chains	113	jP	pp	2 340	8	96	2 230	22
	TP-57-82	No Site Prep.	53	jP	pp	2 530	10	97	2 450	20
	TP-58-82	Barrels & Chains	23	bS	pp	2 630	7	79	2 080	15
	TP-59-82	Barrels & Chains	41	bS	pp	1 950	11	93	1 820	29
	TP-60-82	Barrels & Chains	26	wS	br	2 040	15	75	1 530	19
				wS	pp	3 180	12	96	3 060	34
	TP-61-82	Barrels & Chains	2	bS	pp	2 550	11	80	2 040	17
	TP-62-82	Barrels & Chains	12	bS	sb	2 460	16	88	2 160	22
	TP-63-82	Barrels & Chains	5	wS	pp	0	-	-	-	-
	TP-64-82	Barrels & Chains	10	wS	pp	2 674	11	81	2 160	17
	TP-67-82	Burn	260	jP	pp	1 480	9	96	1 420	19
	TP-69-82	Burn	54	bS	pp	2 290	9	100	2 290	20
				jP	pp	2 120	10	96	2 040	21

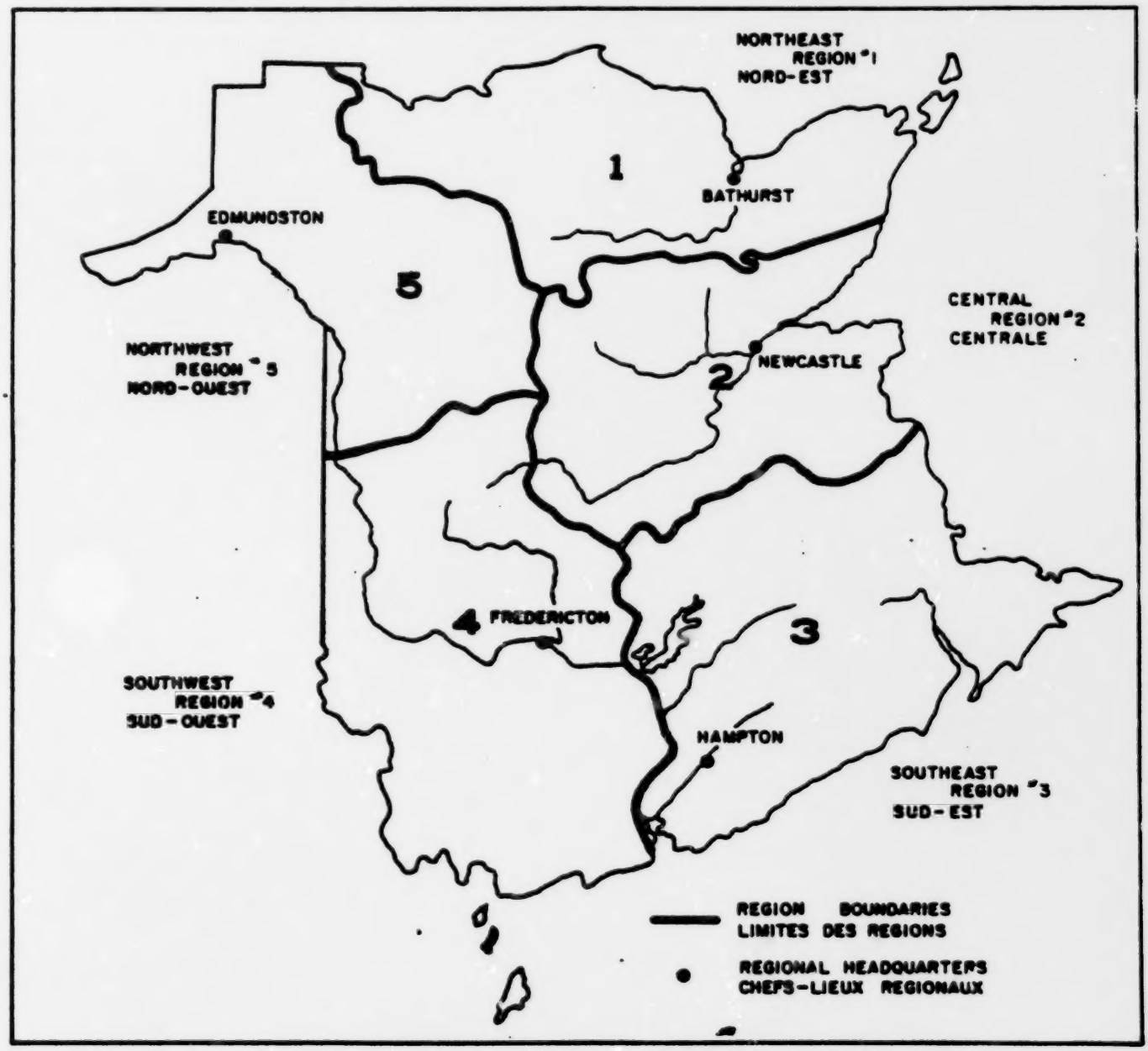
Region	Plantation	Site Preparation	Area (ha)	Species	Stock Type	Original Year		First Year		
						Density (trees/ha)	Height (cm)	Survival (%)	Density (trees/ha)	Height (cm)
4	TP-70-82	Burn	77	jP	pp	1 560	8	99	1 540	19
	TP-71-82	Barrels & Chains	20	bS	pp	2 460	10	74	1 820	12
	TP-100-82	Barrels & Chains	6	bS	pp	1 910	12	87	1 660	8
	TP-102-82	Barrels & Chains	68	bS	pp	1 930	16	88	1 690	14
	TP-103-82	Herbicide & Barrels & Chains	106	bS	pp	1 380	12	83	1 150	11
	TP-104-82	Barrels & Chains	80	bS	pp	1 170	6	73	860	15
	NRP	Barrels & Chains		bS	sb	1 440	16	88	1 270	18
5	P-8-82	C&H Plow	17	bS	br	1 910	17	87	1 660	19
				wS	br	2 670	17	43	1 150	13
	P-9-82	C&H Plow	6	bS	br	700	31	100	700	34
	P-11-82	C&H Plow	17	bS	br	1 820	28	84	1 530	36
	P-15-82	C&H Plow	20	bS	br	2 720	32	92	2 500	36
				L	pp	1 400	6	91	1 270	16
	P-16-82	C&H Plow	5	bS	br	2 860	17	58	1 660	19
	P-17-82	C&H Plow	10	bS	br	1 660	21	95	1 570	24
	P-18-82	C&H Plow	13	bS	br	1 910	40	100	1 910	42
				wS	br	1 273	21	100	1 270	23
	P-19-82	C&H Plow	14	bS	br	1 080	36	94	1 020	41
	P-20-82	Disc Trencher	8	wS	br	2 420	19	87	2 100	22
	P-21-82	Disc Trencher	44	wS	br	1 760	31	92	1 610	33
	P-22-82	Disc Trencher	13	wS	br	2 080	40	100	2 080	40
	TP-19-82	C&H Plow	105	bS	pp	2 270	7	99	2 240	8

Region	Plantation	Site Preparation	Area (ha)	Species	Stock Type	Original Year		First Year		
						Density (trees/ha)	Height (cm)	Survival (%)	Density (trees/ha)	Height (cm)
5	TP-22-82	C&H Plow	26	bS	pp	1 660	6	96	1 592	5
	TP-24-82	C&H Plow	30	wS	pp	1 820	11	70	1 270	11
	TP-25-82	C&H Plow	4	wS	pp	2 040	11	88	1 780	17
	TP-26-82	C&H Plow	6	bS	br	1 500	33	100	1 500	38
				wS	pp	2 160	7	94	2 040	12
	TP-28-82	C&H Plow	19	bS	pp	955	11	100	955	12
	TP-29-82	C&H Plow	99	bS	pp	1 260	12	94	1 180	15
	TP-33-82	Disc Trencher	30	bS	pp	1 040	3	85	890	11
	TP-34-82	Disc Trencher	23	bS	pp	2 290	4	92	2 101	11
				L	pp	1 780	28	86	1 530	40
	TP-35-82	Disc Trencher	16	bS	pp	610	12	96	590	13
	TP-36-82	Disc Trencher	65	bS	pp	1 310	7	92	1 200	9
	TP-37-82	Disc Trencher	17	bS	pp	1 660	13	97	1 610	11
	TP-38-82	Disc Trencher	55	bS	pp	1 430	13	98	1 400	14
	TP-39-82	Disc Trencher	30	bS	pp	1 990	11	92	1 830	14
	TP-40-82	Disc Trencher	29	bS	pp	1 680	10	79	1 320	13
	TP-41-82	Disc Trencher	11	bS	pp	1 270	14	100	1 270	14
	TP-42-82	Disc Trencher	36	bS	pp	1 880	11	83	1 560	13
	TP-43-82	Disc Trencher	44	bS	pp	2 450	13	88	2 160	17
	TP-44-82	Disc Trencher	31	bS	pp	2 710	12	96	2 610	16
	TP-45-82	Disc Trencher	24	bS	pp	2 500	13	92	2 290	14
				wS	br	2 800	19	95	2 670	21
	TP-47-82	Disc Trencher	15	bS	pp	1 910	15	87	1 660	16

Region	Plantation	Site Preparation	Area (ha)	Species	Stock Type	Original Year		First Year		
						Density (trees/ha)	Height (cm)	Survival (%)	Density (trees/ha)	Height (cm)
5	TP-48-82	Disc Trencher	82	bS	pp	1 600	13	82	1 300	14
	TP-94-82	C&H Plow	312	bS	pp	1 580	13	90	1 420	23

APPENDIX II

REGION BOUNDARIES
DEPARTMENT OF NATURAL RESOURCES



LIMITES DES REGIONS
MINISTERE DES RESSOURCES NATURELLES